National Aeronautics and Space Administration
Glenn Research Center

Return To Flight

Shuttle Main Landing Gear Door Environmental Seals

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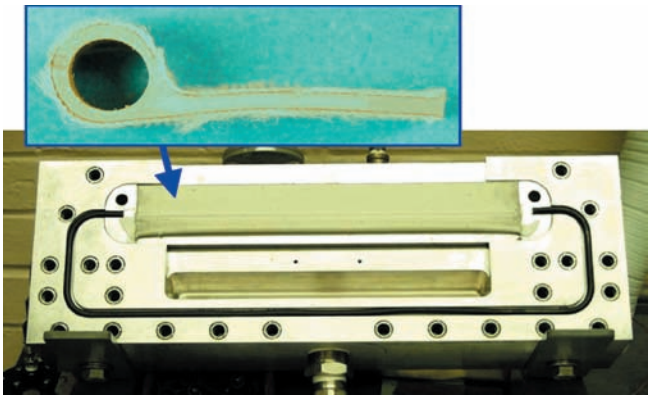
The Glenn Research Center (GRC) Seals Team is playing an important role in evaluating environmental seals for the main landing gear (MLG) doors of the Space Shuttle. Engineers at the Kennedy Space Center (KSC) and Johnson Space Center (JSC) recently discovered that the doors would not close completely when new seals were installed on Space Shuttle Discovery, a condition unacceptable for flight. To function properly, the seals must be compressed enough to seal the doors, but too much compression generates excessive loads that prevent the doors from closing. To help solve this problem, KSC and JSC requested GRC's assistance in evaluating the seals.

Shuttle main landing gear locations.

KSC and JSC are also concerned that the seals become permanently compressed when the doors are closed for long periods of time. This could lead to a situation in which hot reentry gases flow past the seals and into the MLG bay. GRC seal tests will help shuttle engineers decide when to replace them to avoid this potentially dangerous situation.

The GRC Seals Team has been performing a series of leakage tests and compression tests to evaluate seal performance. Tests performed by GRC to date have identified a minimum amount of seal compression required to meet KSC's seal leakage goals. GRC compression tests on the seals have also determined compression levels at which seal loads become excessively high. Together these tests have defined an acceptable range of compression levels on the seals to achieve the best seal performance. All test results have been shared with KSC and JSC to help guide seal installation on the orbiters.



In the next phase of work, GRC will perform leakage and compression tests using permanently compressed seals that flew on the Space Shuttle. A long-term compression test will also be performed to evaluate seal resiliency after 30 days under compression.

Tests performed on the MLG door environmental seals by the GRC Seals Team are helping JSC reduce risks in seal performance and are an important element of the Shuttle Return to Flight Program.